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## (54) SAFETY CONTAINER

(71) We, NATIONAL PLASTICS LIMITED, a British Company, of Avenue Works, Walthamstow Avenue, London E4 8SY, England, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following Statement:—

- 10 In recent years there has been a considerable interest in containers for drugs and other dangerous substances having closures that cannot easily be opened by children, but are readily opened by an adult. This invention relates to such containers, which in combination with their closures, are commonly referred to as "safety containers". Many designs of safety container have screw-threaded or bayonet-type closures in which complementary key parts have to be engaged together in order to rotate the closure to open the container, but these constructions are expensive to produce since the closures comprise two or more parts which have to be assembled together. Safety containers with snap-on closures have been proposed in which external index marks on the container and the closure have to be aligned by rotating the closure in order to align an internal key part on one component with a gap in a part of the other component in order to allow the closure to be removed. Such alignment of the index marks could be achieved by a child by trial even if it did not appreciate the significance of the index marks. The invention provides a safety container with a snap-on closure which does not suffer from this disadvantage.
- 40 By a snap-on closure we mean a closure of flexible resilient material, such as a plastics material, having a skirt with an inward bead adjacent its extremity to ride over and snap below a complementary bead adjacent to the mouth of the container.

The position of the bead on the closure is such that when it is so engaged below the bead on the container its upper face presses against the complementary lower face of the bead on the container so as to hold the closure firmly against the mouth of the container. The lower face of the bead on the closure and/or the upper face of the bead on the container (relative to the normal upright position of the container) is/are sloped or chamfered to assist the bead on the closure to ride over the bead on the container as the closure is pressed into position. Usually the beads on both container and closure are continuous around the container mouth and the closure skirt respectively. However an equivalent would be a number of spaced projections, elongate in the circumferential direction, around the container mouth and/or the closure skirt and it is intended that such equivalent arrangements should be embraced by the term 'bead' used herein and in the claims following to denote the inter-engaging means on the container and the snap-on closure. If the upper face of the bead on the closure and/or the complementary lower face of the bead on the container is/are similarly sloped or chamfered the closure can be removed from the container with equal facility, but if these other faces, which engage each other when the closure is in position, are parallel to the plane of the container mouth, or nearly so, the closure, once fitted, can be virtually impossible to remove without rupture or the use of considerable force or the assistance of a lever or like implement.

However, it has been found that even with beads of the latter shape, if the bead on the container extends only around the major sector (say 300° or more) of the container mouth instead of encircling it completely then provided the closure has a degree of flexibility enabling its part in the

minor sector to be lifted whilst its bead engages with the complementary bead around the major sector of the container mouth, its skirt will flex sufficiently to enable it to be removed relatively easily. The invention utilises this discovery.

According to the invention a safety container combination comprises a container having a tubular wall part defining a mouth with an outward bead adjacent to the mouth partially encircling the said wall part throughout a major sector thereof and a flexible snap-on closure for the mouth having a skirt to fit over the said wall part with an inward bead extending throughout its inner periphery to snap over and enter into locking engagement with the said outward bead as the closure is pressed onto the mouth, the face of the said outward bead remote from the mouth and the complementary face of the inward bead being similarly disposed, and locking means on the container located in the minor sector defined by the said major sector for releasably engaging the inward bead to resist opening movement of the part of the closure in the region of the minor sector.

With this arrangement the engagement of the locking means with the bead on the closure skirt secures the closure in position on the container just as if the bead around the container was continuous, as described above. On releasing the locking means the part of the closure in the region of the minor sector of the container mouth can be lifted, flexing the closure, and then the bead on the closure skirt will deform sufficiently to ride over the bead on the container and allow the closure to be removed completely.

It will be understood, of course, that the angle of the radii defining the major and minor sectors must be determined in conjunction with the flexibility of the closure and the shape of the beads to provide secure closing when the locking means engages the bead on the closure skirt, but permit easy removal of the closure when the locking means is released from the bead. Also, for the container to be secure against children, the presence of the locking means and the manner of its release must not be apparent when the container is closed, and preferably its design is such that the force required to release it is greater than could normally be applied by a child.

The face of the outward bead on the container remote from the mouth (hereinafter called the "lower" face, in relation to the normal upright position of a container having a mouth at the top) is preferably parallel to the plane of the container mouth, with the complementary face of the inward bead on the closure skirt similarly disposed, but one or both of these

faces may be undercut or otherwise shaped to increase the effectiveness of the locking engagement between the two beads when the container is closed. The degree of undercut or shaping will be small, however, since otherwise the closure would be unduly difficult to remove without damage to one or both the beads.

Preferably the locking means is an outward tooth, which may be of similar cross-section to the bead on the container, located in the middle of the minor sector and normally aligned with the ends of that bead to engage the bead on the closure skirt but movable inwardly against a resilient restraint so as to disengage it from the bead on the closure skirt to enable the closure to be removed. The tooth may be, and preferably is, formed integrally with the container, for example by moulding, in which case the adjacent tubular part of the container wall is designed to provide the resilient restraint.

An embodiment of the invention is illustrated by way of example by the drawing accompanying the Provisional Specification in which:—

Figure 1 is a perspective view of part of the container for a safety container combination, being moulded of plastics material, and

Figure 2 is a section on the plane AA of the container shown in Figure 1, with the closure of the combination in position on the container.

The container wall part 1 is tubular, of circular cross-section defining a mouth 2 at its end, and has an outward bead 3 extending around the mouth 2 throughout a major sector of its periphery defined by radii at an angle of  $333\frac{1}{2}^{\circ}$ . The upper face 4 of the bead 3 (that is the face more or less directed towards the mouth 2) is chamfered at an angle of  $60^{\circ}$  to the plane of the container mouth 2 and its lower face 5, remote from the mouth, is parallel to that plane. The portion 6 of the tubular wall part of the container adjacent to the mouth and in the minor sector defined by the said radii and the ends of the bead 3 is of reduced thickness to increase its flexibility compared with the remainder of the wall so that this portion may be deformed inwardly, by thumb or finger pressure applied as shown, to the position indicated by dotted lines and designated 6a. The plastics material of the container is sufficiently flexible to permit this deformation without fracture and is sufficiently resilient to cause the wall portion 6 to revert to its original position when pressure is released.

In the middle of the upper edge of the wall portion 6 is formed an outward tooth 7 of similar cross-section to the bead 3 and aligned with the ends of the bead. The

dimensions of the wall portion 6 are such that when it is deformed inwardly as shown, with the application of such pressure as can comfortably be applied by the thumb or finger or an adult, the tooth 7 can be moved radially inwardly a distance somewhat greater than the radial dimension of its lower face.

The closure 8 of the safety container combination, shown in cross-section in Figure 2, is a normal type of snap-on closure moulded in flexible and resilient plastics material, for example polyethylene, having a skirt 9 of length somewhat greater than the depth of the bead 3 from the plane of the mouth 2 of the container and an inward bead 10 extending around the extremity of the skirt, of radial dimension somewhat less than the radial dimension of the lower face 5 of the bead 3 from the outside of the container wall. The upper and lower faces of the inward bead 10 are substantially parallel to the plane of the inner face 11 of the closure which engages and closes the mouth of the container, as shown in Figure 2.

When the closure is applied to the mouth of the container the edge of the lower face of its inward bead 10 engages the chamfered upper face of the outward bead 3 on the container, and the corresponding upper face of the tooth 7. Closing pressure applied downwardly to the closure causes the inward bead 10 to ride down the upper faces of the outward bead 3 and the tooth 7, flexing the skirt 9 outwardly, until it snaps over the bead 3 and tooth 7, and its upper face engages the lower face 5 and the corresponding lower face of the tooth 7. When the closure is so fitted to the container, as shown in Figure 2, it cannot readily be removed due to this engagement of the inward and outward beads 3 and 10 and the tooth 7. There is no ready means for applying a pull to the closure, and the disposition of the complementary engaging faces of the beads parallel to the mouth of the container ensures that there is no ready tendency for the inward bead 10 of the closure to expand to pass over the outward bead 3 of the container. However, if the container wall portion 6 is pressed inwardly to the position 6a shown in dotted lines, the tooth 7 will be withdrawn from engagement with the inward bead of the closure, and that part of the closure in the minor segment between the ends of the bead 3 can be pushed upwardly. This flexes the closure skirt 9, and presents its inward bead 10 at an angle to the ends of the outward bead 3 of the container such that the bead 10 can ride over these ends, again flexing the skirt 9 outwardly, and the closure can then be pulled off the container.

The presence of the tooth 7, and the flexi-

bility of the reduced portion 6 of the container wall are not evident when the container is closed. A child will normally attempt to open the container by grasping the closure and twisting and pulling it. This will have no effect since the closure is free to rotate and the beads cannot be disengaged by pulling the closure. Whilst a child might eventually discover the tooth 7 and the need to press the wall part 6 inwardly the stiffness of this wall part is made such that firm pressure from an adult digit is required to deform it sufficiently to disengage the tooth 7 from the bead 10, beyond the capability of a normal young child's hand.

To reduce the chance of the reduced wall part 6 being detected by a child, the reduction in thickness could be provided by a recess on the inside of the tubular wall part 1 instead of the outside, with a simple projection on the outside to indicate its location. A word such as "press" could be moulded or marked on the container wall to identify this location, but this is considered undesirable, it being envisaged that the pharmacist or other supplier who supplies the container to a user will give instructions as to the means of opening.

The invention thus provides a simple safety container for use with an ordinary snap-on closure which can be moulded conveniently in plastics with minimal variation in tooling from an ordinary container with a snap-on closure. Opening the container is simple once the method is known, and indeed, with small containers the design can be such that the container can be held in one hand and the locking means can be released and the closure be pushed off in one movement with the thumb.

#### WHAT WE CLAIM IS:—

1. A safety container combination comprising a container having a tubular wall part defining a mouth with an outward bead adjacent to the mouth partially encircling the said wall part throughout a major sector thereof and a flexible snap-on closure for the mouth having a skirt to fit over the said wall part with an inward bead extending throughout its inner periphery to snap over and enter into locking engagement with the said outward bead as the closure is pressed onto the mouth, the face of the said outward bead remote from the mouth being substantially parallel to the plane of the mouth and the complementary face of the said inward bead being similarly disposed, and locking means on the container located in the minor sector defined by the said major sector for releasably engaging the inward bead to resist opening movement of the part of the

closure in the region of the minor sector.

2. A safety container combination as claimed in claim 1 wherein the locking means is an outward tooth normally positioned for engaging the inward bead and movable inwardly to release the inward bead, resilient means being provided for urging the tooth, when so moved, towards its normal position.

- 10 3. A safety container combination as claimed in claim 2 wherein the tooth has a face for engagement by the inward bead of the closure as the latter is applied to the container, the face being shaped to enable the inward bead to ride over and snap behind the tooth as it rides over and snaps behind the outward bead on the container.

- 20 4. A safety container combination as claimed in claim 3 wherein the tooth is of the same profile as the outward bead on the container and is aligned with the ends thereof.

- 25 5. A safety container combination as claimed in any preceding claim wherein the locking means is integral with the said tubular wall part of the container.

6. A safety container combination as

claimed in claim 5 wherein the said tubular wall part is of deformable resilient material. 30

7. A safety container combination as claimed in claim 6 wherein the portion of the tubular wall part of the container in the said minor sector is of reduced thickness to render it more flexible than the remainder of the tubular wall part. 35

8. A safety container combination as claimed in claim 7 wherein the reduced thickness is provided by a recess on the inside of the tubular wall part in the said minor sector. 40

9. A safety container combination substantially as hereinbefore described with reference to and as illustrated by the drawing accompanying the Provisional Specification. 45

10. A container for a safety container combination as claimed in any preceding claim.

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